A standard for the organization of quantitative MRI data: BIDS extension proposal 001

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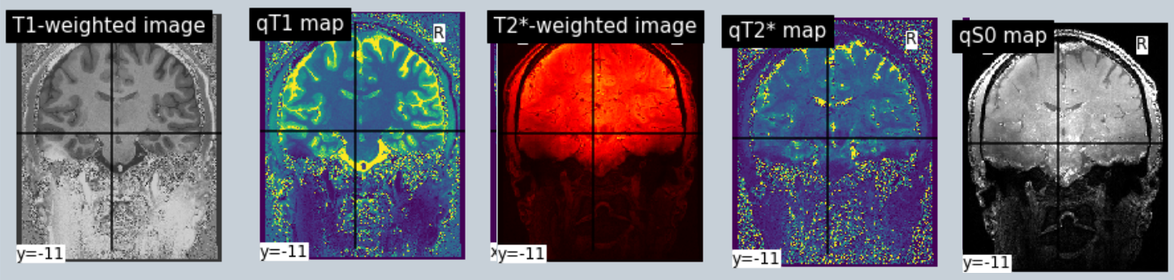
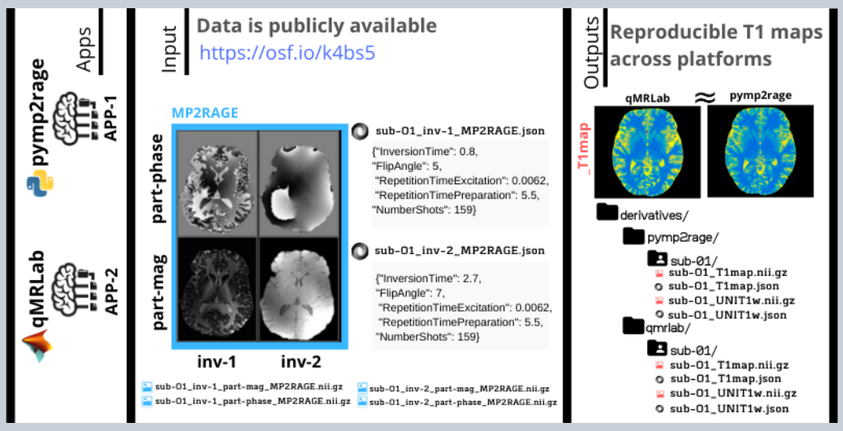
Quantitative MRI



- Anatomical images with image intensities that represent physical units (e.g., T1 in seconds)
- Unlike grayscale images, these **quantitative maps** better replicate across sites and time-points.
- Quantitative maps can be used in **microstructural characterization** of human brain (e.g., myelination)
- Created by carefully designed multi-image scan protocols + data fitting to biophysical models

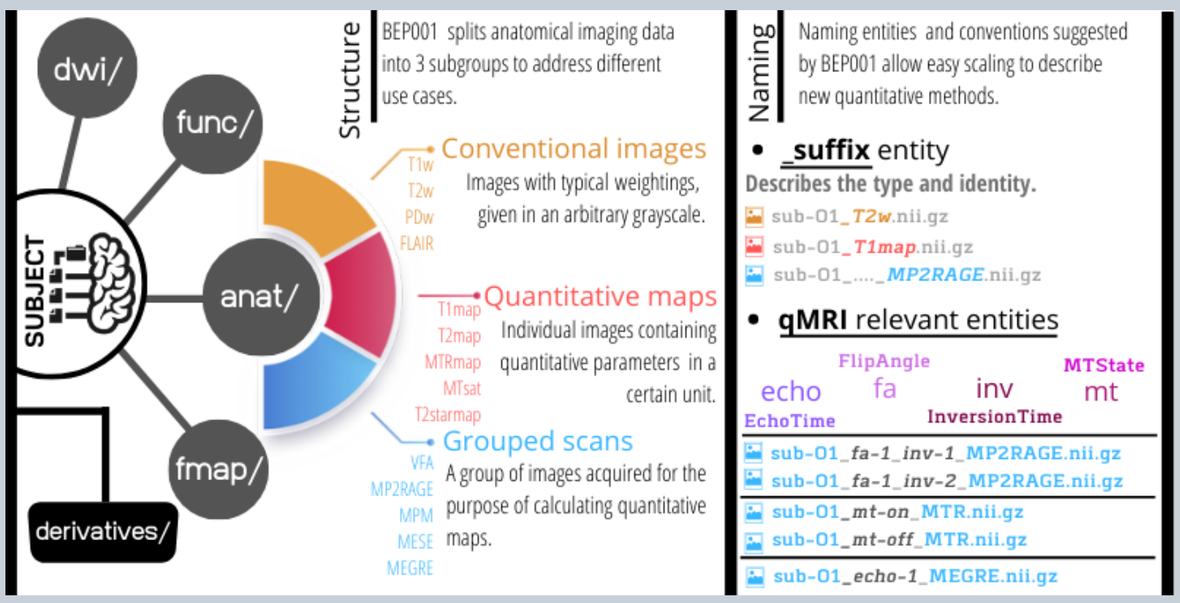
Example application



- To demonstrate a use case, we used two open-source software packages, pymp2rage and qMRLab, for T1 mapping using MP2RAGE data from our open repository, leading to highly similar results.

BEP-001: goal

- BEP-001 strived to extend BIDS in such a way that it can include much-used qMRI protocols, such as **MP2RAGE**, **Multi-Parametric Mapping (MPM)**, **Multi-Echo GRE (MEGRE)**, and **Variable Flip Angle (VFA)** protocols.
- BEP-001 also includes guidelines for which metadata should be included, for these protocols, such that the relevant qMRI models can be fitted.
- BEP-001 strived to be an **open, community-driven effort**, incorporating the voices of researchers from many different fields and backgrounds.



Example datasets are available!

BEP-001: Core ideas

- The suffixes of imaging data in the *anat*-folder can now be subdivided in three groups: (1) **conventional**, weighted images (*_T1w*, *_T2w*), (2) **grouped scan collections** (e.g., *_MP2RAGE*, *_MPM*) and (3) **quantitative maps** (e.g., *_T1map*, *_Chimap*)
- There is a list of currently 8 grouped scan collections that are common in the (MR physics) literature with clear descriptions and examples of how such data should be structured and which metadata should be included.

Current status

- BIDS extension Proposal 001 has been in development for over three years.
- There is currently a draft of the extension that will soon be officially presented to the wider BIDS community.

https://bep001.readthedocs.io/

github

We kindly solicit your feedback!